QUALITY CONTROL AND MONITORING

Diploma Semester-6

020030604

UNIT 1 : INTRODUCTION TO QUALITY OF CONSTRUCTION

1. According to whom, “Quality is fitness for use”?

a) Juran
b) Crosby
c) Joseph
d) Feigenboum

2. According to whom, “Quality is conformance to requirements or specifications”? a)

Juran

b) Crosby
c) Joseph
d) Feigenboum

3. According to whom, “Quality is what the customer says it is”?

a) Juran
b) Crosby
c) Joseph
d) Feigenboum

4. Which apparatus is generally used to measure the soundness of the cement?
a) Vicat Apparatus
b) Le-Chatelier apparatus
c) Soundness meter
d) Abrams apparatus

5. Which apparatus is generally used to measure the fineness of the cement?
a) Vicat Apparatus
b) Air-permeability test
c) Soundness meter

d) Abrams apparatus

6. Match the following questions with correct answer:

	QUESTION		OPTIONS
1	Fineness of cement for OPC	A	37 N/mm^2
2	Compressive strength of cement at 7 days	B	20 X 10 X 10 cm
3	Nominal size of brick	C	19 X 9 X 9 cm
4	Standard size of brick	D	10%

a) 1-d, 2-b, 3-c, 4-a

b) 1-c, 2-b, 3-d, 4-a

c) 1-d, 2-a, 3-b, 4-c

d) 1-a, 2-b, 3-d, 4-c

7. What is the permissible limits for construction of organic matter in water?

a) 200mg/l

b) 2000mg/l

c) 3000mg/l

d) 500mg/l

8. What is the permissible limits for construction of suspended matter in water?

a) 200mg/l

b) 2000mg/l

c) 3000mg/l

d) 500mg/l

9. What is the permissible limits for construction of chlorides in water?

a) 200mg/l

b) 2000mg/l

c) 3000mg/l

d) 500mg/l

10. What is the permissible limits for construction of inorganic matter in water? a) 200mg/l
b) 2000mg/l
c) 3000mg/l
d) 500mg/l

11. What should be the weight of brick?

a) 2.5 to 3.0 kg
b) 2.2 to 3.2 kg
c) 2.7 to 3.1 kg
d) 2.4 to 3.1 kg

12. What should be nominal size of brick in cm?

a) 19 X 10 X 10
b) 19 X 9 X 9
c) 20X 10 X 10
d) 20 X 9 X 9

13. What should be standard size of brick in cm?

a) 19 X 10 X 10
b) 19 X 9 X 9
c) 20X 10 X 10
d) 20 X 9 X 9

14. For walls, columns and vertical faces of all structural members, the form work is generally removed after _____ a) 24 to 48 hours
b) 3 days
c) 7 days
d) 14 days

15. What should be height when brick is dropped on flat ground for braking test of brick? a)

1.0 m

b) 1.2 m
c) 1.3 m
d) 1.1 m

16. What should be compressive strength of first class brick?

a) 7 N/ mm^2
b) 7.5 N/ mm^2
c) 3.5 N/ mm^2
d) 3.0 N/ mm^2

17. What should be compressive strength of second class brick?

a) 7 N/ mm^2
b) 7.5 N/ mm^2
c) 3.5 N/ mm^2
d) 3.0 N/ mm^2

18. Efflorescence is seen on the bricks which are made from the soil containing too much of:

a) lime

b) silica
c) alkalis
d) iron oxides

19. Water absorption for first class bricks should not be more than

a) 12%
b) 15%
c) 20%
d) 25%

20. Water absorption for second class bricks should not be more than

a) 12%
b) 22%
c) 20%
d) 25%

21. Water absorption for third class bricks should not be more than

a) 12%
b) 22%

c) 20%
d) 25%

22. Water absorption when immersed in water for 24 hours and crushing strength of first class bricks should be

a) 15 %, 10.5 N/ mm^2
b) 20 %, 7.0 N/ mm^2
c) 22 %, 7.0 N/ mm^2
d) 20 %, 10.5 N/ mm^2

23. The compressive strength of first class bricks should not be less than

a) 7 N/ mm^2
b) 7.5 N/ mm^2
c) 3.5 N/ mm^2
d) 10.0 N/ mm^2

24. Alkali content (Na_2O) in aggregate should not exceed _____ a) 0.03%
b) 0.02%
c) 0.06%
d) 0.01%

25. Aggregates to be used for wearing course, the impact value shouldn't exceed _____ percent. a) 30
b) 35
c) 40
d) 25

26. Aggregates to be used for wearing course, the abrasion value shouldn't exceed _____ percent. a) 30
b) 35
c) 40
d) 25

27. Aggregates to be used for wearing course, the crushing value shouldn't exceed _____ percent. a) 30
b) 35
c) 40
d) 25

28. Aggregates to be used for Non-wearing course, the impact value shouldn't exceed _____ percent. a) 30
b) 45
c) 40
d) 25

29. Aggregates to be used for Non-wearing course, the abrasion value shouldn't exceed _____ percent. a) 30
b) 35
c) 50
d) 25

30. Aggregates to be used for Non-wearing course, the crushing value shouldn't exceed _____ percent. a) 30
b) 45
c) 40
d) 25

31. What is the size of fine aggregates?
a) 4.75mm
b) < 4.75mm
c) > 4.75mm
d) 12mm

32. What is the size of coarse aggregates?
a) 4.75mm
b) < 4.75mm
c) > 4.75mm
d) 12mm

33. Which are the methods of sub-soil exploration?

a) direct methods
b) semi-direct methods
c) Indirect methods
d) all of the above

34. Which is the semi-direct method of sub-soil exploration?

a) trenches
b) trial pits
c) borings
d) test pits

35. Mechanical compaction is applicable to _____

a) cohesion less
b) cohesive
c) both of them
d) none of them

36. Which type of solution is used for grouting?

a) soil (bentonite)
b) cement
c) sodium silicate
d) asphalt emulsion

37. Which type of suspension is used for grouting?

a) sodium silicate
b) sodium chloride
c) calcium chloride
d) asphalt emulsion

38. what should be depth of racking in brick masonry for plastering?

a) 15 mm
b) 12 mm
c) 10 mm
d) 13 mm

39. What should be depth of racking in stone masonry for plastering?

a) 15 mm
b) 12 mm
c) 10 mm
d) 13 mm

40. For slabs, the formwork should be removed after _____

a) 3 days
b) 7 days
c) 21 days
d) 28 days

41. For beam soffits, the formwork should be removed after _____ a)

3 days

b) 7 days
c) 21 days
d) 28 days

42. For removal of props under slabs and spanning up to 4.5 m, the formwork should be removed after _____

a) 3 days
b) 7 days
c) 14 days
d) 28 days

43. For removal of props under slabs and spanning over 4.5 m, the formwork should be removed after _____
a) 3 days
b) 7 days
c) 14 days
d) 28 days

44. For removal of props under beams and arches and spanning over 6 m, the formwork should be removed after _____

a) 3 days
b) 7 days

c) 14 days
d) 21 days

45. For removal of props under beams and arches and spanning up to 6 m, the formwork should be removed after _____

a) 3 days
b) 7 days
c) 14 days
d) 28 days

46. For proper ventilation inside the room, the area of openings in the wall shall be at least _____

a) 10 % of the floor area
b) 12 % of the floor area
c) 15 % of the floor area
d) 20 % of the floor area

47. In schools, hospitals, offices the wall openings shall be at least _____

a) 10 % of the floor area
b) 12 % of the floor area
c) 15 % of the floor area
d) 20 % of the floor area

48. What is the full form of QCIP_____?

a) quality control interpretation plan
b) quality control interpretation program
c) quality control inspection program
d) quality control inspection plan

49. For 100 gm cement when sieved through 90-micron sieve for 10 minutes, the weight of retained OPC cement should not be more than _____

a) 10 %
b) 15 %
c) 20 %
d) 12 %

50. When cement bags are stored in room, it should be kept away from walls for about _____

a) 30 cm
b) 50 cm
c) 25 cm
d) 35 cm

51. Not more than 5% of sand should pass through _____ sieve a)

100 micron

b) 120 micron
c) 110 micron
d) 130 micron

52. 100 % sand should pass through _____ sieve

a) 2.36 mm
b) 4.75 mm
c) 100 micron
d) 10.5 mm

53. For plastering work, projections more than _____ the surface are knocked off so as to obtain uniform surface of wall.

a) 13 mm
b) 10 mm
c) 12 mm
d) 15 mm

UNIT 3 : SAMPLING

1.The mean of sampling distribution is _____

a) less than mean of process distribution
b) more than mean of process distribution

c) equal to mean of process distribution
d) any of the above

2.The percent of the sample means will have values that are within ±3 standard deviations of the distribution mean is _____
a) 95.5
b) 96.7
c) 97.6
d) 99.7

3.Which of these is not an advantage of acceptance sampling over the 100% sampling plan?
a) Less expensive
b) Highly costly
c) Applicable to destructive testing
d) Lesser manpower is needed

4.Sequential sampling is an extension of _____
a) Single sampling plan
b) Double-sampling plan
c) Multiple-sampling plan
d) 0% sampling

5.Which is most economical of these?
a) Single sampling plan
b) Double-sampling plan
c) Multiple-sampling plan
d) 100% sampling
(ans :a)

6. Which of this technique involves the risk of good lot may be selected for the purchaser?

a) Acceptance sampling

b) 100% sampling
c) 0% sampling
d) 50% sampling

7.What is done in single sampling plan?
a) Only one unit is checked
b) Only the first lot is checked 100%
c) Only n samples of 1 unit are checked
d) Only one sample of n units is checked
(ans : d)

7.Double-sampling plan is _____
a) Only 2 units are checked
b) Only the first and last lot is checked 100%
c) Only two samples of n units are checked (necessarily)
d) Only two samples of n units are checked (conditionally)
(ans : d)

8.Which of these requires planning and documentation of the sampling procedure?
a) Acceptance sampling
b) 100% sampling
c) 0% sampling
d) 50% sampling
(ans : a)

9. Which of these quite successfully fulfills the following sentence?
"The rejection of entire lots as opposed to the simple return of defectives often provides a stronger motivation to the supplier for quality improvements."
a) 0% sampling
b) 100% sampling
c) Random % of the lot sampling
d) Acceptance sampling
(ans : d)

10. Following are results of strength on a material. Find mean strength.

15, 16.2, 14.3, 15.9, 17.2, 18.1, 14.9, 16, 16.4(units)

a) 15

b) 16

c) 17

d) 18

11.Which term is having a closest meaning as Sampling Distributions?
a) Control charts

b) Onsite inspection
c) Whole lot inspection
d) Acceptance sampling

12. Following are results of strength on a material. Find median.

15, 16.2, 14.3, 15.9, 17.2, 18.1, 14.9, 16, 16.4(units)

a) 15.9
b) 16.9
c) 17.9
d) 18.9

13. The type of sampling in which lot submitted for inspection consists of certain groups of clusters of items and then few groups of items are selected is called _____

a) Single random sampling
b) systematic sampling
c) stratified sampling
d) cluster sampling

14. The type of sampling in which each item in a lot has an equal chance of being selected is called _____

a) Single random sampling
b) systematic sampling
c) stratified sampling
d) cluster sampling

15. From a stack of 200 bricks, a sample of 10 bricks was taken by simple random sampling. The compressive strength of bricks is 7.20, 7.10, 6.94, 8.05, 7.5, 6.40, 8.20, 7.60, 8.0, 7.25. find average strength of bricks of the lot.

a) 7.42
b) 7.45
c) 8.42
d) 8.43

16. From a stack of 200 bricks, a sample of 10 bricks was taken by simple random sampling. The compressive strength of bricks is 7.20, 7.10, 6.94, 8.05, 7.5, 6.40, 8.20, 7.60, 8.0, 7.25. If the minimum acceptable compressive strength is 7.0 N/mm^2, determine % defective bricks in the lot.

a) 20%
b) 10%
c) 30%
d) 25%

17. When it is difficult to select random samples from large lots, which type of sampling method is used?

a) Single random sampling
b) systematic sampling
c) stratified sampling
d) cluster sampling

18. The type of sampling in which inspection lot should be divided in sub-lots is called

a) Single random sampling
b) systematic sampling
c) stratified sampling
d) two stage sampling

19. The type of sampling in which one item is chosen at random from the lot and thereafter, the items are selected regularly at predetermined intervals is called.

a) Single random sampling
b) systematic sampling
c) stratified sampling
d) two stage sampling

20. The number of items in a sample is called _____

a) sample size
b) sample
c) lot size

d) lot
(ans : a)

21.Each element of a sample is called _____

a) range
b) sample
c) item
d) lot

(ans : c)

22. In a 5 bricks sample, number of items are _____

a) 0

b) 1

c) 5

d) insufficient data

23. If from a lot of 5000 bricks, a sample of 10 bricks is taken then, sampling fraction _____

a) 0

b) 5/1

c) 1/5

d) insufficient data

24 When each member of a population has an equally likely chance of being selected, this is called:
a) Single random sampling
b) systematic sampling
c) stratified sampling
d) two stage sampling

25. Which of these is not a correct statement for Acceptance Sampling?

a) Concerned with inspection of products

b) Concerned with decision making regarding products

c) One of the oldest aspects of quality assurance

d) One of the oldest aspects of quality control

26. Acceptance sampling can be used as ___
a) Incoming inspection activity
b) Outgoing inspection activity
c) Both, incoming and outgoing inspection activity
d) Neither incoming nor outgoing inspection activity

27. Which of these procedures doesn't provide direct form of quality control?
a) Control charts
b) Acceptance sampling
c) Design of experiments
d) Control patterns

28. Which of these can be used as an audit tool to ensure the output of a process conforms to requirements
?
a) Control charts
b) EWMA chart
c) Acceptance sampling
d) np-charts

29. Which of these is not used in sampling?
a) 0% inspection
b) 100% inspection
c) Acceptance sampling
d) 5% inspection

30. When is the 100% inspection done?
a) The supplier's process is so good that defective units are never encountered
b) The supplier's process is so bad that almost every unit is defective
c) The component is extremely critical
d) The component is moderately critical

31. Acceptance sampling is not used when ___
a) The test is destructive
b) The cost of 100% inspection is quite high
c) The supplier's process capability is very high
d) Although the supplier process is satisfactory but a program is needed for continuous monitoring

32. When the inspection error rate is sufficiently high, which of these is used as the sampling technique?
a) 0% inspection
b) 100% inspection
c) 50% inspection
d) Acceptance sampling

(ans : d)

33. Following are results of strength on a material. Find standard deviation.

15, 16.2, 14.3, 15.9, 17.2, 18.1, 14.9, 16, 16.4(units)

a) 1.18

b) 1.16

c) 1.15

d) 1.13

34. Which type of inspection method is used when available inspection staff is less?

a) Sampling inspection
b) 100% sampling
c) 0% sampling
d) 50% sampling

35. Which is the most expensive for the same testing process and product component to be tested?
a) Acceptance sampling
b) 100% sampling
c) 0% sampling
d) 50% sampling

(ans : b)

36. Which has the most probability of rejecting the good lot?

a) Acceptance sampling

b) 100% sampling
c) 0% sampling
d) Can’t be predicted

37. Which type of inspection method is used when available inspection staff is more?

a) Acceptance sampling
b) 100% sampling
c) 0% sampling
d) 50% sampling

38. Which has the more handling damage during inspection?

a) Acceptance sampling
b) 100% sampling
c) 0% sampling
d) 50% sampling

39. Which has higher inspection cost per lot?

a) Acceptance sampling
b) 100% sampling
c) 0% sampling
d) 50% sampling

40. Which of these can’t be used for destructive tests?

a) Acceptance sampling
b) 100% sampling
c) 0% sampling
d) 50% sampling

41. Which of this method is suitable when it is possible to take risk in the selection of item?

a) Acceptance sampling
b) 100% sampling
c) 0% sampling
d) sampling inspection

42. Which has smaller inspection cost per lot?

a) Acceptance sampling

b) 100% sampling

c) 0% sampling

d) sampling inspection

43. Which of this sampling method involves conforming or not conforming to a quality specification?

a) Acceptance sampling

b) 100% sampling

c) 0% sampling

d) 50% sampling

44. Which of this technique is used to determine the acceptance or rejection of a lot on the basis of number of defective parts found in a random sample drawn from a lot?

a) Acceptance sampling

b) 100% sampling

c) 0% sampling

d) 50% sampling

45. When a decision on acceptance or rejection of the lot is made on the basis of only one sample, it is called _____

a) single sampling plan

b) Double sampling plan

c) Multiple sampling plan

d) Sequential sampling plan

46. When a decision on acceptance or rejection of the lot is made on the basis of only two sample, it is called _____

a) single sampling plan

b) Double sampling plan

c) Multiple sampling plan

d) Sequential sampling plan

47. When a decision on acceptance or rejection of the lot is made on the basis of more than two sample, it is called _____

a) single sampling plan
b) Double sampling plan
c) Multiple sampling plan
d) Sequential sampling plan

48. When a decision on acceptance or rejection of the lot is made on the basis of accumulated evidence, it is called _____

a) single sampling plan
b) Double sampling plan
c) Multiple sampling plan
d) Sequential sampling plan

49. In which sampling plan, items from lots are inspected one by one (or group by group)?

a) single sampling plan

b) Double sampling plan
c) Multiple sampling plan
d) Sequential sampling plan

50. Which of this technique involves the risk of good lot may be rejected for the supplier? a) Acceptance sampling

b) 100% sampling
c) 0% sampling
d) 50% sampling

UNIT 5 : STATISTICAL QUALITY CONTROL

1. The dividing lines between random and non-random deviations from mean of the distribution are known as
a) upper control limit
b) lower control limit
c) control limits
d) two sigma limits

2. Process control is carried out
a) before production
b) during production
c) after production control
d) All of the above

3. Low cost, higher volume items require
a) no inspection
b) little inspection
c) intensive inspection
d) 100% inspection

4. The chart used to monitor attributes is
a) Range chart
b) Mean chart
c) p-chart
d) All of the above

5. The control chart used for the fraction of defective items in a sample is
a) Range chart
b) Mean chart
c) p-chart
d) c-chart

6. The control chart used for the number of defects per unit is
a) Range chart
b) Mean chart
c) p-chart
d) c-chart

7. LCL for the R chart is given by ____
a) D3 R
b) D2 R
c) R – D3 R
d) d2 R

8. UCL for the R chart is given by ____
a) D4 R
b) D2 R
c) R – D3 R
d) d2 R

9. The average value of the quality characteristic corresponding to in-control state is represented by ___ in the control charts.
a) CL
b) UCL
c) LCL
d) Sample number
(ans : a)

10. When a record shows only the number of articles conforming and non-conforming to any specified requirement, it is said to be _____

a) Attributes
b) Continuous characteristics
c) Discrete characteristics
d) Variables
(ans : a)

11.The highest value that a quality characteristic can take before the process becomes out-of-control, is called _____
a) Center line
b) Upper control limit
c) Lower control limit
d) Control limit
(ans : b)

12. Which one of these tells explicitly about the potential capability of the process?
a) Histogram
b) Probability plots
c) PCRs
d) Control charts
(ans : d)

13.Which chart should be used, if possible?
a) x & R Charts
b) u Charts
c) p Charts
d) c Charts
(ans : a)

14. Quality characteristics which are related to only conforming or non-conforming products, are called
a) Attributes
b) Continuous characteristics
c) Discrete characteristics
d) Variables
(ans : a)

15.Defectives word has almost same meaning as _____
a) Conforming
b) Nonconforming
c) Non-defective
d) Un-conforming
(ans : b)

16. The control chart which relates to the fraction of defective product produced by a manufacturing process, is called
a) The control chart for nonconformities
b) Control charts for fraction nonconforming
c) Control charts for conformities per unit
d) Control chart for process mean
(ans : b)

17.The control chart designed to deal with the defects or nonconformities of a product, is called _____
a) p chart
b) c chart
c) R char
d) s chart

18.The sample fraction nonconforming is expressed as ____

a) p = 2D/n
b) p = D/3n
c) p = D/2n
d) p = D/n
(ans : d)

19.The center line of control chart of fraction nonconforming represents the value equal to ____
a) Fraction nonconforming
b) Process mean
c) Process standard deviation
d) Sample mean
(ans : a)

20.If there are 9 items defective in the sample size of 28, what will be the value that the fraction nonconforming chart, will represent?
a) 0.2971
b) 0.3214
c) 0.6328
d) 0.8172
(ans :b)
Explanation : The fraction nonconforming chart center line when standards are given, represents the value of fraction nonconforming which in this case, where m=1, D=9, n=28, is,

$$\bar{p} = \frac{[\sum_{i=1}^{m} D_i]}{mn} = \frac{9}{28} = 0.3214$$

21. A single measureable quality characteristic, such as dimension, weight, or volume, is called ____
a) Variable
b) Attribute
c) Variable and an Attribute
d) Mean and variability

22. When attributes charts are used when ___
a) Destructive testing is required
b) Process must be continuously stabilized and monitored for its capability
c) Historical summary of process performance is needed
d) Existing process but in chronic trouble

23.Which of these does not require SPC implementation?

a) When Specifications change without notice
b) When customer demands both control and capability
c) When process is stable
d) When the process is estimated to reduce its capability in near future

24. X chart is a _____

a) Attribute control chart
b) Variable control chart
c) Neither a variable control chart nor an attribute control chart
d) Falls in the category of both variable and attribute control charts

25. Upper control limit for a x chart is expressed by ____

a) $\bar{\bar{x}} + A_2R$
b) $\bar{\bar{x}} - A_2R$
c) $\bar{\bar{x}} - A_3R$
d) $\bar{\bar{x}} + A_3R$

26.Which chart should be interpreted first when both, x chart and R chart are indicating a non-random behavior?

a) x chart
b) R chart
c) X and R chart
d) Trial Limits
(ans : b)

27.What is the formula for UCL for x bar chart when s is known?

a) UCL = $\bar{\bar{x}} + A_3$
b) UCL = $\bar{\bar{x}} - A_2$
c) UCL = $\bar{\bar{x}} - A_3$
d) UCL = $\bar{\bar{x}} + A_2$

28.What is the formula for LCL for x bar chart when s is known?

a) UCL = $\bar{\bar{x}} + A_3$